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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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KONRAD RAYNES & VICTOR, LLP
315 S. BEVERLY DRIVE
210
BEVERLY HILLS, CA 90212

EXAMINER

LUND, JEFFRIE ROBERT

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 10/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/770,275

Applicant(s)

NAMOSE, ISAMU

Examiner

Jeffrie R. Lund

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-19 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1,2 and 4-19 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 02 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/805,382.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 4, 6, 9, and 12-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Wofford et al, US Patent 5,750,823.

Wofford et al teaches an apparatus for processing PFC gases (hexafluoroethane (C_2F_6) and tetrafluoromethane (CF_4)) found in low pressure waste streams produced during semiconductor etching and deposition processes for manufacturing electronic devices that includes: a waste stream inlet pipeline 1; a vacuum pump 2; a reactive material supply section 7 for supplying a paraffin hydrocarbon (CH_4) and O_2 into the waste stream; a plasma process section 12 downstream from the reactive supply section 7; and a cyclone collector 13 downstream of the plasma process section of the collection of the particulate matter i.e. polymer (column 5 lines 9-11) created by the plasma process section. The plasma process section 12 is located on the high-pressure side of the vacuum pump 2 and operates in a pressure range from low pressure to near atmospheric pressure, which includes atmospheric pressure (column 1 lines 8-10). (Entire document)

It is inherent that the low-pressure waste streams produced during

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semiconductor etching and deposition processes for manufacturing electronic devices are formed in an etching or deposition processing chamber.

Alternately, it would be obvious to connect the waste stream inlet pipeline, which supplies the waste streams produced during semiconductor etching and deposition processes for manufacturing electronic devices, to a processing chamber in which the etching and deposition methods are carried out.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wofford et al, US Patent 5,750,823, in view of Rizzie et al, US Patent 5,720,165.

Wofford et al was discussed above.

Wofford et al differs from the present invention in that Wofford et al does not teach that the cyclone collector with sloped side walls, an upper gas port, includes a pair of open/close partitions at the bottom of the cyclone collector for the simultaneous deposition and recovery of the polymer, or that the partitions are hinged.

Rizzie et al teaches a standard cyclone collector 104 that includes sloped sidewalls 96, an upper gas port 86, 186, and two open/close partitions 109 for the simultaneous deposition and recovery of ash. (Entire document)

Hinging a partition to enable it to open and close is well known, and commonly

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used in the art.

The motivation for adding the sidewalls, gas ports, and the two open/close partitions of Rizzie et al is to provide the generically described cyclone collector of Wofford et al with a specific structure.

The motivation for hinging the open/close portions is to provide an opening means to enable the partitions to open and close.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the sidewalls, gas ports, and the two open/close partitions of Rizzie et al to the cyclone collector of Wofford et al, and to make the partitions hinged.

5. Claims 7, 8, 10, 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wofford et al, US Patent 5,750,823, in view of Herman et al, US Patent 6,261,524 B1.

Wofford et al was discussed above.

Wofford et al differs from the present invention in that Wofford et al does not teach a gas inlet for injecting hydrogen coupled to the system after the plasma process section or supplying CH_3OH (methanol) or $\text{C}_2\text{H}_5\text{OH}$ (ethanol).

Herman et al teaches a PFC abatement system that includes using hydrogen, methanol, and ethanol as reactive materials supplied to the process chamber, and that gases can be injected into the fluid stream at the entrance, exit, or multiple locations in between. (Figures, column 4 lines 1-25)

The motivation for using methanol or ethanol as reactive material supplied to the

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plasma process section of Wofford et al is to provide an alternate reactive gas source from which to react with the PFC as taught by Herman et al. The motivation for adding hydrogen via a gas inlet after the plasma process section is to provide an additional reactive material to the waste stream after the plasma process section to provide the "optimum chemistry and stoichiometry" of the reaction as taught by Herman et al (column 4 line 10) or to provide a carrier gas to ensure the proper of gas through the cyclone collector.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use methanol or ethanol in the plasma process section of Wofford et al, and to supply hydrogen via an inlet after the plasma process section of Wofford et al as taught by Herman et al.

6. Claims 1, 2, 4, 6, 9, and, 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al, US Patent 6,055,927, in view of Wofford et al, US Patent 5,750,823.

Shang et al teaches a processing chamber 10 connected to a vacuum pump 36 and a burn box 66 for treating waste gases at atmospheric pressure. The processing chamber uses common halogen compounds including perfluoride gases.

Shang et al differs from the present invention in that Shang et al does not teach using PFC or a waste system that includes a reactive material supply, a plasma process section, or a cyclone collector.

Wofford et al was discussed above.

The motivation for using PFC gases in the apparatus of Shang et al is to enable

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Shang et al to use different known etching gas and to perform different etching or cleaning methods such as ashing. The motivation for replacing the generic burn box of Shang et al with the plasma treatment system of Wofford et al is to provide a specific waste treatment system that is more efficient in treating PFC waste gases as taught by Wofford et al, and required by Shang but only generically described.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use PFC gases in the processing chamber and to replace the waste gas treatment system of Shang et al as taught by Wofford et al.

7. Claims 5 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al and Wofford et al as applied to claims 1-4, 6, 9, and 12-14 above, and further in view of Rizzie et al, US Patent 5,720,165.

Shang et al and Wofford et al differ from the present invention in that they do not teach that the cyclone collector with sloped side walls, an upper gas port, includes a pair of open/close partitions at the bottom of the cyclone collector for the simultaneous deposition and recovery of the polymer, or that the partitions are hinged.

Rizzie et al teaches a standard cyclone collector 104 that includes sloped sidewalls 96, an upper gas port 86, 186, and two open/close partitions 109 for the simultaneous deposition and recovery of ash. (Entire document)

Hinging a partition to enable it to open and close is well known, and commonly used in the art.

The motivation for adding the sidewalls, gas ports, and the two open/close partitions of Rizzie et al is to provide the generically described cyclone collector of

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Shang et al and Wofford et al with a specific structure.

The motivation for hinging the open/close portions is to provide an opening means to enable the partitions to open and close.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the sidewalls, gas ports, and the two open/close partitions of Rizzie et al to the cyclone collector of Shang et al and Wofford et al, and to make the partitions hinged.

8. Claims 7, 8, 10, 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al and Wofford et al as applied to claims 1-4, 6, 9, and 12-14 above, and further in view of Herman et al, US Patent 6,261,524 B1.

Shang et al and Wofford et al differ from the present invention in that they does not teach a gas inlet for injecting hydrogen coupled to the system after the plasma process section or supplying CH_3OH (methanol) or $\text{C}_2\text{H}_5\text{OH}$ (ethanol).

Herman et al teaches a PFC abatement system that includes using hydrogen, methanol, and ethanol as reactive materials supplied to the process chamber, and that gases can be injected into the fluid stream at the entrance, exit, or multiple locations in between. (Figures, column 4 lines 1-25)

The motivation for using methanol or ethanol as reactive material supplied to the plasma process section of Shang et al and Wofford et al is to provide an alternate reactive gas source from which to react with the PFC as taught by Herman et al. The motivation for adding hydrogen via a gas inlet after the plasma process section is to provide an additional reactive material to the waste stream after the plasma process

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section to provide the "optimum chemistry and stoichiometry" of the reaction as taught by Herman et al (column 4 line 10) or to provide a carrier gas to ensure the proper of gas through the cyclone collector.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use methanol or ethanol in the plasma process section of Wofford et al, and to supply hydrogen via an inlet after the plasma process section of Shang et al and Wofford et al as taught by Herman et al.

Response to Arguments

9. Applicant's arguments filed July 11, 2005 have been fully considered but they are not persuasive.

In regard to the argument that Wofford et al does not appear to describe an apparatus that generates a "polymer" as claimed in claim 1, the Examiner disagrees for the following reasons:

- a. The product, i.e. a polymer, produced by an apparatus is an intended use of the apparatus, and a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Wofford et al teaches the claimed structure including the specific type of gas supplied.
- b. Second, as noted by the Applicant, Wofford et al teaches supplying a reactive material, specifically, paraffin hydrocarbon (CH₄) and O₂ to a waste

stream containing PFC gases (hexafluoroethane (C_2F_6) and tetrafluoromethane (CF_4)) to convert the PFC gases to carbon dioxide and hydrogen fluoride.

However, no reaction is 100% effective, and by supplying a mixed gas containing PFC gases and a paraffin hydrocarbon to a plasma, a polymer is formed as one of the many by-products. Wofford et al recognizes this fact by providing a cyclone particle trap downstream from the plasma chamber 12 to trap the polymer particles formed in the plasma. (See column 5 lines 8-11)

c. Finally, one of ordinary skill in the art would expect a polymer to be formed in any reaction that includes a PFC and a hydrocarbon.

In regard to the argument that Wofford et al does not teach an apparatus in which the mixed gas is subjected to a plasma process under the atmospheric pressure to generate a polymer as recited in claim 1, the Examiner disagrees for the following reasons:

- a. No specific operating pressure is claimed other than "under the atmospheric pressure". This limitation includes all pressures from an absolute vacuum to just under the atmospheric pressure. The apparatus of Wofford et al teaches operating in the pressure range from low pressure to near atmospheric (column 1 lines 8-10). The Examiner interprets near atmospheric pressure to include atmospheric pressure.
- b. The specific operating pressure is an intended use of the apparatus, and a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably

distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Wofford et al is capable of operating at the claimed pressure.

c. As noted by the Applicant, Wofford et al teaches the plasma chamber 12 is located on the high-pressure side of the pump 2 and the low-pressure side of the pump 14. Pump 14 is specifically used to maintain the desired pressure in the plasma chamber 12 (column 5 line 12), thus sets the desired operational pressure including under atmospheric.

In regard to the argument that Herman et al is a non-plasma apparatus and one of ordinary skill would not have any desire to combine a non-plasma apparatus and plasma apparatus, the Examiner disagrees. It has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Herman et al and Wofford et al are in the applicant's field of endeavor, i.e. treating PFC with a reactive material, and reasonably pertinent to the particular problem, i.e. which reactive gases to mix with a PFC waste stream and how to mix the reactive gases. The specific gases used to react with the PFC waste stream and how to most efficiently mix the gases is important to both plasma and non-plasma systems. Therefore, one of ordinary skill would be interested in a better reactive gas source or a more efficient way to mix the gases.

In regard to the arguments that Shang et al, the examiner disagrees. Shang et al

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is used to teach a deposition and or etching chamber that uses a perfluoride and a generic burn box at atmospheric pressure. The combination of Shang et al and some other reference that teaches a waste treatment system is expected and taught by Shang et al. Shang et al teaches a burn box but does not describe the burn box.

Therefore one of ordinary skill applying the teachings of Shang et al would have to go to the gas treatment art and choose a specific waste treatment apparatus such as Wofford et al. Wofford et al also teaches that a plasma system is more efficient than a combustion system.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art teaches the technological background of the invention.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

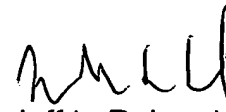
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (6:30 am-6:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jeffrie R. Lund
Primary Examiner
Art Unit 1763

JRL
10/11/05